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# Acrylamide Economics Survey: Rig Operating Costs and Personal Protective Equipment

FINAL Report

Economics and Policy Analysis Branch  
Economics, Exposure and Technology Division  
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## **CONTRIBUTORS**

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## **SECTION 1**

### **CONTRACTOR INTERVIEWS**

#### **1.1 Summary for Contractor Contacts**

As of October 5, 2001, we have called nearly 50 contractors. Eleven of these contractors (23 percent) were not in the scope of the survey because they do not use acrylamide grout. We have had nine responses from contractors (19 percent). We provide summaries of the conversations below, which include all responses the contractors were willing and/or able to make.

##### ***1.1.1 Operating Costs***

Cost estimates ranged from \$100 to \$200 per hour (six of nine good responses).

##### ***1.1.2 Personal Protective Equipment***

###### ***1.1.2.1 Suits***

Tyvek suits appear to be the protective suit of choice for use during mixing, cleaning, and contact. Two contractors also mentioned using rubber or vinyl aprons in addition to these suits. One contractor who only uses the liquid form of acrylamide reported they did not use suits at all. Contractors appeared to be most concerned about using the suits during mixing operations (and to some extent cleaning operations). Manhole operations also require using suits during grouting operations. Multiple suits were often used during the day and disposed of after operations. A contractor in Florida suggested the possibility that workers might be reluctant to wear the suits during high temperatures. Another contractor mentioned that workers may partially dress down after mixing when working in the grouting vans.

###### ***1.1.2.2 Foot Protection***

Workers typically wear rubber boots. Three contractors specifically mention the use of Tyvek booties.

#### *1.1.2.3 Gloves*

We had a wide range of responses to questions about gloves; they varied from basic surgical gloves to combined layers of types of gloves. Some contractors also specifically mentioned the length of the gloves (i.e., up the elbows).

#### *1.1.2.4 Respirator*

Nearly all contractors used some type of respirator. Although we spoke with people identified by their company as the most knowledgeable about grouting operations, many could not recollect specific characteristics of these respirators. Several contractors also mentioned ventilation or exhaust units in their trucks. One respondent suggested that this piece of equipment was provided by the rig manufacturer as part of the purchase of the rig.

#### *1.1.2.5 Personal Protective Equipment Recommendations*

Survey responses indicate that Avanti is the source of PPE information. Contractors can be divided into three categories regarding Avanti's training course: all workers likely attend, select persons attended who returned to train grouting workers, or no one has attended but they are familiar (or think they are familiar) with the training materials. However, we are concerned that the responses we received regarding this section of the survey may have been influenced by the order of the questions. For example, after providing answers about the PPE the contractors were currently using, they seemed hesitant to say anything other than that they were following Avanti's general recommendations.

#### *1.1.2.6 Other Claims Made*

One respondent suggested PPE materials are provided with the purchase of a rig. Another suggested their workers undergo some type of annual blood test to test for exposure.

### **1.2 Contractor: Rockline Vac Systems, Inc.**

State: FL

Contact: Thomas Dean (Owner)

Date of Interview: 9/28/01

### ***1.2.1 Operating Costs***

Rockline estimated their operating costs to be \$125 per hour.

### ***1.2.2 Personal Protective Equipment***

#### ***1.2.2.1 Suits***

Workers wear Tyvek suits for mixing operations. They also wear the suit in manhole grouting operations. Mr. Dean stated that heat is a problem (Florida), and he could not dismiss the possibility that workers would remove the suits because of heat-related conditions. The suits are taken off frequently, disposed of after use, but sometimes reused.

#### ***1.2.2.2 Foot Protection***

Workers wear rubber boots.

#### ***1.2.2.3 Gloves***

Workers wear latex or rubber gloves during all grouting operations.

#### ***1.2.2.4 Respirator***

Workers wear half-mask respirators during mixing. Mr. Dean states that basic PPE supplies (respirators) are supplied by the manufacturer of rigs (Aries). When asked about other supplies, he answered with a degree of uncertainty but seemed to suggest items such as suits may also be supplied. This survey was one of the last conducted, and it was the first time a contractor had raised this issue. Therefore, it is unclear to us whether this statement is inaccurate or just uncommon.

#### ***1.2.2.5 Personal Protective Equipment Recommendations***

Although he was familiar with the Avanti training course, he could not recall Avanti PPE recommendations.

### **1.3 Contractor: Visu-Sewer Clean & Sealer, Inc.**

State: WI

Contact: Ernie Alexander

Date: 9/28/01

#### ***1.3.1 Operating Costs***

Visu-Sewer Clean & Seal, Inc. estimated their operating costs to be \$185 per hour.

### ***1.3.2 Personal Protective Equipment***

Recommendations were obtained from Avanti and 3M. These included the following:

Coveralls: Grouting  
Gloves: Grouting, mixing and cleanup  
Boots: Grouting, mixing and cleanup  
Respirators: Mixing

Workers have attended the Avanti training course. Avanti recommends the following:

Coverall: Throw away coveralls  
Gloves: Rubber medium duty  
Boots: Rubber—waterproof  
Respirator: No response provided

Grouting—Coveralls, gloves, boots, safety glasses, face shield

Mixing—Coveralls, gloves, full face respirator

Cleaning—Gloves, eye protection.

#### ***1.3.2.1 Suits***

Suits are mandatory. Workers wear Tyvek suits for grouting operations (less than an hour). Heat relief measures include forced air ventilation and blowers directed at the body. Suits are seldom removed during the day and put back on.

#### ***1.3.2.2 Foot Protection***

Workers wear rubber boots for grouting. No disposable booties are worn.

#### ***1.3.2.3 Gloves***

Workers wear heavy rubber gloves (over the elbow) during mixing, grouting, and equipment cleaning.

#### ***1.3.2.4 Respirator***

Workers wear a full-mask respirator and face shield during mixing and cleaning. This respirator uses an organic vapor/acid-gas with hepa prefilter 3m60923. Cartridges are changed after 10 hours of accumulated use.

### **1.4 Contractor: Araco Sewer and Drain Service, Inc.**



State: MA

Contact: Adam Arakelian (Vice President)

Date: 9/21/01

#### ***1.4.1 Operating Costs***

Araco Sewer and Drain Service, Inc. estimated their operating costs to be \$150 per hour.

#### ***1.4.2 Personal Protective Equipment***

##### ***1.4.2.1 Suits***

Workers wear Tyvek suits for mixing, grouting, and cleaning operations. The respondent stated that workers tend to strip down the Tyvek suit when working with the grouting truck. Several suits are worn and disposed of each day.

##### ***1.4.2.2 Foot Protection***

Workers wear rubber boots with Tyvek booties. Workers have one set of work boots for grouting operations and one set for working within the shop.

##### ***1.4.2.3 Gloves***

Workers wear latex gloves covered by PVC or cloth gloves.

##### ***1.4.2.4 Respirator***

Workers wear all types of respirators (he identified charcoal?). Cartridges are changed every week.

##### ***1.4.2.5 Personal Protective Equipment Recommendations***

He has taken the Avanti training course and provides training for his workers.

#### **1.5 Contractor: Kim Construction Company**

State: IL

Contact: Lawrence Vallow (Part-Owner)

Date: 9/21/01

### ***1.5.1 Operating Costs***

Kim Construction Company estimated their operating costs to be \$100 per hour.

### ***1.5.2 Personal Protective Equipment***

This company noted that they did not use acrylamide grout frequently.

#### ***1.5.2.1 Suits***

Workers wear Tyvek suits for mixing, grouting, and cleaning operations. The suit is removed and disposed of several times each day.

#### ***1.5.2.2 Foot Protection***

Workers wear rubber boots.

#### ***1.5.2.3 Gloves***

Workers wear PVC disposable gloves (50 mils).

#### ***1.5.2.4 Respirator***

Workers wear a half-mask respirator (identified as a "North half mask"). The company uses purple cartridges, and they are changed every other day.

#### ***1.5.2.5 Personal Protective Equipment Recommendations***

He is familiar with the Avanti training course and states that his PPE procedures are consistent with Avanti recommendations.

**1.6 Contractor: Municipal Pipe Tool Co.**

State: IA

Contact: Steve Gearhart

Date: 9/21/01

***1.6.1 Operating Costs***

Municipal Pipe Tool Co. estimated their operating costs to be \$350 per day. Many of the other contractors thought this value was too low.

***1.6.2 Personal Protective Equipment***

***1.6.2.1 Suits***

Workers wear Tyvek suits for mixing and cleaning operations. The suit is removed and disposed of each day.

***1.6.2.2 Foot Protection***

Workers wear rubber boots.

***1.6.2.3 Gloves***

Workers wear rubber gloves up to their elbows.

***1.6.2.4 Respirator***

Workers wear a half-mask organic vapor respirator during mixing operations along with separate eye protection.

***1.6.2.5 Personal Protective Equipment Recommendations***

Workers attend the Avanti training course.

**1.7 Contractor: Great Lakes TV-Seal, Inc.**

State: WI

Contact: Jeff Healey

Date: 9/21/01

***1.7.1 Operating Costs***

Great Lakes TV-Seal, Inc. declined to answer.

### ***1.7.2 Personal Protective Equipment***

#### ***1.7.2.1 Suits***

Workers are required to wear Tyvek suits during grouting only. The suit is removed and disposed of each day. The respondent also mentioned the use of vinyl aprons.

#### ***1.7.2.2 Foot Protection***

We did not ask this question.

#### ***1.7.2.3 Gloves***

Workers wear nitrile gloves during mixing, grouting, and equipment cleaning.

#### ***1.7.2.4 Respirator***

Workers wear respirators during mixing only. The respondent stated that the grouting worker receives a blood test each year.

#### ***1.7.2.5 Personal Protective Equipment Recommendations***

He has attended the Avanti training course.

### **1.8 Contractor: Altair Environmental Group**

State: FL

Contact: Beau Thompson (President)

Date: 9/21/01

#### ***1.8.1 Operating Costs***

Altair Environmental Group estimates their operating costs to be \$100 to \$150 per hour.

### ***1.8.2 Personal Protective Equipment***

The contractor uses only the liquid form of acrylamide grout.

#### ***1.8.2.1 Suits***

This company does not use suits.

#### ***1.8.2.2 Foot Protection***

Their employees wear regular work boots.

#### *1.8.2.3 Gloves*

Workers wear heavy duty plastic gloves.

#### *1.8.2.4 Respirator*

Their workers do not use respirators. Their trucks have a ventilation system.

#### *1.8.2.5 Personal Protective Equipment Recommendations*

He has reviewed Avanti materials. Workers do not attend the Avanti training course.

### **1.9 Contractor: Specialty Sewer Services, Inc.**

State: MO

Contact: Norm Sirna (Retired)

Date: 9/19/01

#### ***1.9.1 Operating Costs***

Specialty Sewer Services, Inc. referred us to Bob Miller.

#### ***1.9.2 Personal Protective Equipment***

Mr. Sirna is retired and based his answers on previous experience. The responses below should be viewed in this context. To date, we have not been able to contact Mr. Miller to get his responses.

##### ***1.9.2.1 Suits***

Workers wear rubber aprons during mixing. Tyvek suits are used during manhole grouting operations. They are changed frequently and disposed of at the end of each day. He mentioned that workers may remove the top part of the suit after mixing. Suits are changed regularly and are not reused. Heat is a potential problem because the mixing room is not air conditioned.

##### ***1.9.2.2 Foot Protection***

Workers wear rubber boots or leather redwing waterproof boots.

##### ***1.9.2.3 Gloves***

Workers wear surgical gloves during mixing.

#### *1.9.2.4 Respirator*

Workers use respirators during mixing. The respondent noted the trucks have ventilation systems as well.

#### *1.9.2.5 Personal Protective Equipment Recommendations*

All workers receive Avanti certification.

### **1.10 Contractor: Walden Associated Technologies**

State: IL

Contact: James Bohn

Date: 10/01/01

#### *1.10.1 Operating Costs*

Walden Associated Technologies estimated their operating costs to be \$175 to \$200 per hour.

#### *1.10.2 Personal Protective Equipment*

All workers are certified by the Avanti training course and follow “Avanti’s Safe Operating Process Program.”

##### *1.10.2.1 Suits*

Tyvek suits are worn during mixing, cleaning, and contact with hoses and packers. They are not worn when working within the truck.

##### *1.10.2.2 Foot Protection*

Workers wear rubber boots with Tyvek booties.

##### *1.10.2.3 Gloves*

Workers wear latex gloves with PVC glove covers (up to their elbows).

##### *1.10.2.4 Respirator*

Workers wear a half-mask respirator during mixing when exposed to dry powder. Respirators use an organic vapor acid gas (OVAG) filter with dust pre-filter. Cartridges are changed daily.

#### *1.10.2.5 Personal Protective Equipment Recommendations*

All workers receive Avanti certification. Safety audits are conducted on a regular basis.

## **SECTION 2**

### **MUNICIPALITY INTERVIEWS**

#### **2.1 Summary for Municipality Contacts**

We have called 28 municipalities. As of October 3, 2001, we have had 18 responses, and three of these municipalities use acrylamide grout. One of these three respondents was not willing to participate in the survey. Details of interviews conducted with the other two respondents are provided below. Of the remaining 15 respondents, six use liners to repair sewer lines, three do not use grout, two use grout to repair sewers and manholes but not acrylamide, and four did not know what type of grout was used (all four of these municipalities contract out for their grouting services). One of these four municipalities provided an estimate of the contractor's charges per foot of repairs for sewers and manholes. This information is included below.

#### **2.2 Municipality: City of Redding, CA**

State: CA

Contact: John Tasello

Date of Interview: 10/2/01

##### **2.2.1 *Operating Costs***

The City of Redding did not have information available on operating costs.

##### **2.2.2 *Personal Protective Equipment***

###### **2.2.2.1 *Suits***

Workers wear Tyvek suits for grout application. During mixing, workers wear a rubber apron. These suits are worn for a maximum of 5 hours and disposed of at the end of the day. An air blower is used to provide cooling and ventilation for applicators in a manhole.

###### **2.2.2.2 *Foot Protection***

Workers wear rubber boots. No disposable booties are used.



#### *2.2.2.3 Gloves*

Arm-length rubber gloves are worn during mixing. During application, shorter rubber gloves are worn inside the Tyvek suit.

#### *2.2.2.4 Respirator*

Workers wear half-mask respirators during mixing and application. Workers wear a cartridge designed for protection from vapors during application and one designed for particles during mixing. The cartridges are changed according to the manufacturer's requirements. A face shield is worn in conjunction with the respirators at all times.

#### *2.2.2.5 Personal Protective Equipment Recommendations*

Although he was familiar with Avanti's training course, Mr. Tasello could not recall specific Avanti PPE recommendations. The California Water and Environmental Association is also involved in specifying worker safety procedures, but Mr. Tasello was unable to provide specific recommendations.

### **2.3 Municipality: City of Santa Rosa**

State: CA

Contact: Mark Powell

Date: 10/2/01

The contact was not certain about the use of PPE. He feels very strongly about the safety and functionality of AV-100 and was opposed to any attempt to ban acrylamide. The overall impression from the interview was that Mr. Powell believes workers use a variety of PPE, depending on their discretion. This municipality does not receive any funding from the U.S. EPA.

#### **2.3.1 Operating Costs**

Because this municipality contracts out for their grouting services, cost data were not available. Costs are based on the size of the pipe, its flow, and the number of joints per foot.

## **2.3.2 Personal Protective Equipment**

### **2.3.2.1 Suits**

During sewer repair application there is very little chance for exposure to acrylamide grout. Mr. Powell was unsure if workers wear suits. During manhole application workers usually wear a coverall, and during mixing they wear a splash apron.

### **2.3.2.2 Foot Protection**

None

### **2.3.2.3 Gloves**

Workers wear heavy rubber gloves during grouting operations.

### **2.3.2.4 Respirator**

The use of respirators varies from a small paper dust mask to a full respirator. Almost all workers use a full face shield.

### **2.3.2.5 Personal Protective Equipment Recommendations**

Avanti provides recommendations and a seminar, but Mr. Powell could not recall details.

## **2.4 Municipality: Wakefield, MA**

State: MA

Contact: Tom Hayes

Date: 9/19/01

Problem areas are identified for repair using a "flow isolation monitoring" system. This allows an analysis of which joints are cost-effective to seal. Contractors perform all grouting operations.

### **2.4.1 Operating Costs**

Sewer lines: Contractors charge \$9.60 per foot for an 8" pipe, \$12/foot for a 10" pipe, and \$14.40 for a 12" pipe. Manholes: Contractors charge \$150/vertical foot. The amount of grouting done year to year varies tremendously.

#### **2.4.2 *Personal Protective Equipment***

Not available.